UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,311	10/07/2005	Johan Oonk	294-229 PCT/US	6644

7590 12/12/2007

Ronald J Baron
Hoffmann & Baron
6900 Jericho Turnpike
Syossett, NY 11971

EXAMINER	
NGUYEN, NGOC YEN M	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
12/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/552,311	OONK ET AL.	
	Examiner	Art Unit	
	Ngoc-Yen M. Nguyen	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-8, 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Caren et al (6,357,223).

Caren '223 discloses a method and an apparatus for the reduction of the amount of pollutants, such as carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NO.sub.x), in the exhaust gas stream produced by the high temperature combustion of fuel. The method and apparatus of the invention are useful with internal combustion engines equipped with at least one catalytic convertor in the exhaust system (note paragraph bridging columns 8-10). The fuel can be gasoline, gasoline-based formulations, diesel fuel, alcohol, etc. (note column 11, lines 53-56).

Caren '223 discovered that the presence of OH, as well as that of other active or reactive species, such as other free radicals and gaseous molecular intermediates and oxidizers, including O, H, NO_2, H_2O_2, HO_2, and O_3, in the exhaust gases of a combustion engine in the presence of the requisite oxygen, provides a highly effective catalytic conversion of CO and hydrocarbons to non-polluting gas species, i.e., CO_2 and water vapor. The OH and other related free radical and gaseous molecular oxidizers

created by reaction of OH with gaseous species in the exhaust stream act as catalysts independent of or in conjunction with the normal catalytic function of the catalytic converter (note column 10, lines 7-18).

The free radicals or other active species can be produced by a corona discharge device mounted within the catalytic converter (note Figure 13 and column 13, lines 51-53). The corona discharge as disclosed in Caren '223 is considered the same as the claimed "plasma" and since the corona discharge device is mounted within the catalytic converter, the whole "off-gas stream" is being treated in Caren '223.

In a preferred corona discharge device, high voltage power is required, from about 1,000 to 250,000 Hz (= 1-250 kHz) (note column 16, lines 9-12). The value of 1000 Hz (or 1 kHz) is well within the claimed range.

The introduction of radicals and related gaseous oxidizing species into the combustion gas stream upstream of downstream end of the catalyst in a catalytic convertor results in the catalysis of the oxidation of CO and HC in the exhaust gas stream, and provides for the rapid removal of those pollutants. The catalytic conversion of CO to CO_2 and hydrocarbon to CO_2 and H_2O by these oxidizing species occurs on the large surface in the catalytic converter, as well as in the gas phase in the exhaust stream. The enhanced conversion of CO and HC to CO_2 and H_2O by radicals and other active species frees the bulk of the precious metal catalytic surface from participating in these competing reactions. The converter's precious metal sites no longer need to play as strong a role in catalyzing the less reactive hydrocarbon species, such as *methane*, ethane, ethene, benzene and formaldehyde, and, as a result, the catalytic activity at the

precious metal sites can be directed toward reduction of nitrogen oxides to nitrogen and other non-polluting gas species (note column 10, lines 30-48). In addition, in internal combustion engines equipped with catalytic convertors, the introduction of radicals and/or active gaseous species also enhances the reduction of NO.sub.x to molecular nitrogen (N.sub.2) (note column 9, lines 46-50). This fairly teaches that the process of Caren '223 is suitable for treating an off-gas containing both methane and NO_x.

The catalytic converter 13 therefore comprises any device that catalytically removes or participants in the removal of at least one pollutant from an exhaust stream generated by burning a fuel, including, but not limited to, those with monolithic or granular ceramic substrates, metallic substrates, or substrates of any kind, and devices with noble metals or any other type of catalytic material. It would also include, without limitation, devices having semiconductor catalysts, such as oxides or sulfides of transition elements, and devices having ceramic-type catalysts, such as alumina, silica-alumina, and zeolites individually, in combination with each other and oxygen storage media such as cerium oxide or in combination with metal catalysts (note paragraph bridging column 11-12).

The process of Caren '223 anticipates the claimed process.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caren '223.

Caren discloses a process as stated in the above rejection.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to treat a portion or all of the exhaust gas stream produced by the high temperature combustion of fuel as long as level of the pollutants, such as CO, HC and NO_x of the exhaust stream can be reduced to an acceptable level.

For claim 4 it would have been obvious to one of ordinary skill in the art to optimize the electric field used to generate the corona discharge in the process of Caren '223 in order to sufficiently produce the desired radicals, active or reactive species.

For claim 9, it would have been obvious to one of ordinary skill in the art to optimize the process temperature in Caren '223 to effectively reduce the amount of pollutants from the exhaust stream. It should be noted that Caren '223 discloses the use of the corona discharge in a catalytic converter, i.e. the exhaust gas is treated with a "plasma" in the presence of a catalyst.

For claims 10-13, Caren '223 discloses that a three-way catalyst is typically used (note column 11, lines 60-62) and the disclosure of the noble metals (note column 12, lines 1-2), fairly teaches Pt, Pd, Rh (note column 3, lines 32-45). Caren '223 does not specifically disclose the phase of the alumina or the exact combinations for the catalyst, however, it would have been obvious to one of ordinary skill in the art to use any known

alumina phase and any known combination for the three-way catalyst used in Caren '223.

Applicant's arguments filed October 2, 2007 have been fully considered but they are not persuasive.

Applicants argue that Applicants' claims is directed to the treatment of off-gases resulting from a gas-fired plant and gas-fired plants run on natural gases consisting of primarily of methane.

It should be noted that Applicants' claims do require that the off-gases are from a gas-fired plant, however, "gas-fired plant" as disclosed in Applicants' specification can be gas engine (note page 1, lines 1-2), however, Applicants' claims do not require that the gas-fired plants run on natural gases as argued above. The exhaust gas as disclosed in Caren '223 is from the "combustion of a fuel", thus, such exhaust gas is considered as off-gas resulting from a gas engine, i.e. a gas-fired plant as required in Applicants' claims. Furthermore, Caren '223 does teach that the fuel can be "natural gas" (note column 11, line 57) which is known in the art to contain primarily methane.

Applicants argue that Caren '223 is directed to treating exhaust produced by automobile engines.

The teaching of Caren '223 should not be limited to just the exemplified automobile engines, it should be noted that Caren '223 teaches that the exhaust gases are from the combustion of a fuel (note column 11, lines 53-62), not just gases from

automobile engines. Moreover, there are automobiles available commercially that run on natural gases such as city buses.

For the 103 rejection, Applicants argued that Caren '223 is directed to automobile exhaust systems whereas the Applicants' claims invention is directed to gas-fired plants.

As stated above, the automobile as disclosed in Caren '223 is considered as a gas engine which can in turn be considered as the required gas-fired plants.

Applicants argue that Caren '223 constitutes non-analogous art.

It should be noted that Caren '223 does disclose that the desire to reduce HC (which would include methane) and/or NO_x among other pollutants from the exhaust gas (note column 11, lines 57-62).

Applicants argue that the only temperature listed in Caren '223 is "on the order of about 800°".

Caren '223 discloses the above stated temperature "in certain embodiments" not as a required value. It would have been obvious to one skilled in the art to optimize the temperature in the process of Caren '223 depending on the type of catalyst used, the content of the contaminants to be removed and other process conditions in order to effectively reduce the contaminants in the exhaust gases to an acceptable level.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ngoc-Yen M. Nguyen
Primary Examiner
Art Unit 1793

nmn
December 10, 2007